

*AMENDMENTS TO THE CLAIMS***[Claim 1]**

1. (Currently Amended) An optical encoder comprising:
aan incoherent light source;
a first grating, which is ~~composed of~~ an amplitude grating having a first grating period, for spatial amplitude modulation of the incoherent light from the light source;
a second grating, which is ~~composed of~~ a phase grating having a second grating period, for spatial phase modulation of light from the first grating;
a third grating, which is ~~composed of~~ an amplitude grating having a third grating period, for spatial amplitude modulation of light from the second grating; and
a light-receiving detecting element for receiving detecting light ~~of~~ from the third grating, wherein the encoder detects a relative displacement between the respective gratings.

[Claim 2]

2. (Currently Amended) The optical encoder according to Claim 1, wherein
the second grating is ~~composed of~~ a transparent phase grating having an indented shape with ridges and valleys and a duty ratio of substantially 50%, in which optical path difference between the a ridge and the a valley thereof of the second grating is substantially equal to $\lambda/2$, where λ is wavelength of light.

[Claim 3]

3. (Currently Amended) The optical encoder according to Claim 1, wherein
the second grating is ~~composed of~~ a transparent phase grating having an indented shape with ridges and valleys and a duty ratio of substantially 50%, in which optical path difference between the a ridge and the a valley thereof of the second grating is substantially equal to $\lambda/4$, where λ is wavelength of light.

[Claim 4]

4. (Currently Amended) The optical encoder according to Claim 1, wherein the second grating is composed of a reflective phase grating, and the first and third gratings are arranged on the same side with respect to the second grating.

[Claim 5]

5. (Currently Amended) The optical encoder according to Claim 4, wherein the second grating has an indented shape with ridges and valleys and a duty ratio of substantially 50%, in which optical path difference between ~~the a~~ ridge and ~~the a~~ valley ~~thereof of the second grating~~ is substantially equal to $\lambda/4$, where λ is wavelength of light.

[Claim 6]

6. (Currently Amended)) The optical encoder according to Claim 4, wherein the second grating has an indented shape with ridges and valleys and a duty ratio of substantially 50%, in which optical path difference between ~~the a~~ ridge and ~~the a~~ valley ~~thereof of the second grating~~ is substantially equal to $\lambda/8$, where λ is wavelength of light.

[Claim 7]

7. (Currently Amended) The optical encoder according to Claim 1, wherein the first, ~~the second, and the~~ third gratings have ~~the a~~ same period P , and both a first distance between the first and ~~the~~ second gratings and a second distance between the second and ~~the~~ third gratings are ~~designed~~ substantially to an odd integral integer multiple of $P^2/(4\lambda)$, where λ is wavelength of light.

[Claim 8]

8. (Currently Amended) The optical encoder according to Claim 1, wherein the second grating has a period P , and

the first and ~~the~~ third gratings have ~~the same~~ a period $2P$, and both a first distance between the first and ~~the~~ second gratings and a second distance between the second and ~~the~~ third gratings are ~~designed to~~ substantially odd integral multiple integer multiples of $P^2/(4\lambda)$, where λ is wavelength of light.

[Claim 9]

9. (Currently Amended) The optical encoder according to Claim 1, wherein the second grating is ~~composed of~~ a phase grating in which optical path difference varies sinusoidally.

[Claim 10]

10. (Currently Amended) The optical encoder according to Claim 1, wherein a first distance between the first and ~~the~~ second gratings is different from a second distance between the second and ~~the~~ third gratings, and the ratio of the first distance to the second distance is substantially equal to the ratio of ~~at~~the first grating period of the first grating to ~~at~~the third grating period of the third grating.

[Claim 11]

11. (Currently Amended) The optical encoder according to Claim 1, wherein the first, ~~the~~ second, and ~~the~~ third gratings have rotary scales of rotary type.

[Claim 12]

12. (Currently Amended) The optical encoder according to Claim 1, wherein the first grating has a spatial distribution of transmittance varying that varies sinusoidally.

[Claim 13]

13. (Currently Amended) The optical encoder according to Claim 1, wherein
including a plurality of the light-receiving detecting elements are arranged discretely
with at the third grating period, and the third grating and the light-receiving detecting
elements are integrated with each other.